

SUGGESTIONS FOR THE STANDARDIZATION OF TECHNICAL TERMS IN ENTOMOLOGY.*

By G. C. CRAMPTON, Ph. D.

The ever increasing confusion in the application of anatomical terminology in entomology, is rapidly producing an absolutely intolerable state of affairs, and unless steps toward reform are soon taken, it will eventually become practically impossible to make use of the present system of terminology, in comparative morphological work. Such chaotic and absolutely needless confusion, would not for a moment be tolerated in any other branch of research, and it is difficult to understand why entomologists are supinely indifferent to a state of affairs which can hardly be said to reflect credit upon their scientific spirit or intelligence. If students of mammalian anatomy, for example, were to apply the term "mentum" to the back of the head in lemurs, to the top of the head in monkeys to the forehead in baboons, to the nose in higher apes, and to the chin in man, the storm of protest which such a course of procedure would arouse, can be easily imagined; yet entomologists may with impunity perpetrate a far more astoundingly flagrant manipulation of anatomical terminology than that cited in the foregoing hypothetical case, and no one is moved to even mildly protest!

Lest the preceding statement should seem slightly overdrawn, one of several similar instances of remarkable entomological usage which suggest themselves, may be cited as an illustration. The term "squama," for example, is applied to the sclerites of the labium and maxilla of Odonata, to the terminal sclerite of the male's genital claspers in Bombidæ, to the lens-shaped "first" abdominal segment of Formicidæ, to one or both calyptera of Diptera, to the tegulæ of Hymenoptera and Lepidoptera, to various squamiform structures of certain insects, to the clothing scales of others, etc. etc., "ad infinitum!" We thus have structures located at opposite ends of the body, together with a generous intersprinkling of intermediate points, to which the term "squama" is applied. If the object of en-

*Contribution from the Entomological Laboratory of the Massachusetts Agricultural College, Amherst, Mass.

tomologists, in this and similar instances, has been to bring about a confusion "thrice confounded," they are certainly to be congratulated upon the signal success which has crowned their efforts!

Among the systematists, an awakening of the modern spirit of scientific exactness is apprent in the attempted standardization of entomological nomenclature, and it is to be hoped that the same spirit of scientific exactness may eventually impel them to adopt some standardization of entomological terminology as well. Since no rules or suggestions whatsoever (so far as I am aware) have been formulated for governing the application of entomological terminology, and since it is apparent that some one must take the initiative in this matter, I would venture to offer the following purely tentative suggestions, in the hope that other workers who have been confronted with the same disconcerting confusion in the application of anatomical terminology, may be moved to contribute to the discussion, or to offer better solutions of the difficulties than those here proposed.

(1). Long established or general usage should be one of the most important factors in determining the application of a term. When, however, established usage is wholly at variance with logical consistency, it should always yield to the latter. For example, according to general and established usage, the term *metatarsus* is applied to the basal tarsal segment, no matter whether it be that of the metathorax, mesothorax, or prothorax. According to logical consistency*, however, the term *metatarsus* should always refer to the entire tarsus of the *metathorax*, and of the metathorax alone, since the prefix "meta" delimits all metathoracic structures: e. g. *metanotum*, *metacoxa*, *metafemur*, etc.

(2). The original usage of a term should always be retained. In other words, if the author of a term applied it to a well defined structure, this term should never be applied to any structures other than those homologous with the one to which this designation was originally applied. It is through the disregarding of this principle that much of the present confusion

*The expression "logical consistency" is used advisedly, since it would be consistent to argue that the designation "pro-podeum" should refer to a prothoracic structure, but this blind carrying of consistency to the extreme, would hardly be logical.

of terminology has arisen, and it is extremely unfortunate that a few necessary exceptions prevent the rigid enforcement of this rule. For example, the designation "thorax" was probably introduced by Linne (*Fundamenta Entomologiæ*:—*Amœn. Acad.*, Tome 7, p. 143) who applied it to the pronotum of Coleoptera, Hemiptera, etc., and designated the true thorax as the "truncus." It would be wholly impracticable, at present, however, to attempt to restrict the term "thorax" to the pronotum, and to substitute "truncus" for the accepted and well established use of the term thorax.

(3). If terms have been proposed, without clearly indicating to what structures they should be applied, such terms should be regarded as "nomina nuda," and the first definite application of these terms to insectan structures, should be considered as the original one. For example, the terms presternum, sternum (in the restricted sense), sternellum and poststernum, were originally proposed by MacLeay (*Zool. Journ. London*, Vol. 5, No. 18, 1830) for four hypothetical sternal subdivisions which he neither figured nor described, but merely stated that since they were to be found in *Squilla* and *Julus* (neither of which are insects), they might occur in other "insects." The first application of these terms to insects, was by M'Murtrie (*The Animal Kingdom*, New York, 1831—a translation of Cuvier's work) who applied the terms presternum, sternum and poststernum to the prosternum, mesosternum and metasternum. (The term sternum, however, had been previously used as a general term applied to the sternal region of all segments.)

(4). A term cannot be used at the same time in a broad and in a restricted sense (i. e. the same term cannot be applied to both the whole, and to one of its parts) without creating confusion. For example, the use of the term sternum in the broad sense, to indicate the entire sternal portion of a segment, and in the restricted sense to indicate one of the several sternites, or sternal subdivisions, creates unnecessary confusion, and only the original use of the term should be retained.

(5). Although the law of priority cannot be strictly enforced in anatomical terminology, it is evidently undesirable to apply any more new terms to structures already supplied with suitable designations, unless it can be demonstrated that the older terms are inappropriate, or are incorrectly applied.

(6). It should be permissible to supercede older terms with new ones, if there is no apparent unanimity of opinion among entomologists as to the application of terms concerning which the author himself was in doubt, or if it is impossible to determine to what structures he intended that his terms should refer. In such cases it is far less confusing to apply entirely new terms, than to risk complicating further, an already sufficiently disconcerting state of confusion.

(7). It should be permissible to make slight changes in older terms, to bring them into harmony with modern usage. For example, the designation "sternopleura" might be modified to "sternopleurite," since the designation "pleura" refers to *both* flanks, while the term "pleurite" refers to a pleural sub-division (as is the case with the so called "sternopleura.")

(8). If the author of a term applied it to wholly different (i. e. non-homologous) structures in the same or different insects, it should be permissible to designate the particular structure to which the term should be restricted.

(9). It is advisable to avoid using a designation composed of two or more terms, for such designations are usually too cumbersome to be of practical application (e. g. "processus pteralis alæ primus," etc.) and when possible, should be superceded by a single concise designation, which may be compound or not.

(10). Hybrid terms (i. e. those compounded from different languages) while permissible, are undesirable, and the number of those already in existence should not be further increased.

(11). Designations expressed in a modern language should have no standing (e. g. "antecoxal piece") and should be superceded by terms of Latin or Greek origin, in accordance with general zoological nomenclature.

(12). In attempting to fix the application of anatomical terminology, the usage employed in some one standard work, such as that of Audouin (*Recherches Anatomiques sur le Thorax des Animaux Articulés*:—Ann. Sci. Naturelles, Tome 1. Ser. 1) might be taken as a basis, just as the tenth edition of Linne's "*Systema Naturæ*" is taken by the systematists as the basis for establishing entomological nomenclature. An objection to this suggestion is that Audouin was not at all certain as to the application of some of his terms (for example, he applied the term *parapteron* to wholly different sclerites in

different insects, as pointed out by Crampton, 1914, "On the Misuse of the Terms Parapteron, etc."—*Journal N. Y. Ent. Soc.*, Vol. 22) and in certain instances he applied his terms to wholly unnatural subdivisions of the integument (as is the case with the region which Audouin designates as the "postscutellum," to which attention has been called by Snodgrass, 1909, "The Thoracic Tergum of Insects":—*Ent. News*, Mar. 1909). The same fault is present to a greater degree in all the earlier works upon this subject, which prevents taking any of them as the standard.

(13). Consideration should be given to the usages employed in standard works of reference (text-books, glossaries, etc.) though unfortunately these authorities do not always agree among themselves, nor are they always logical.

(14). Consideration should be also given to the conclusions of any investigator who has made a thorough study of the literature, and of the homologies of the parts in various orders of insects, and has also presented an impartial resumé of all of the available evidence bearing upon the subject, provided that his conclusions are in accord with common sense and logical consistency—which, in the last analysis, must be the governing principles in the application of anatomical terminology.

The opinion of any individual worker has but little weight, and if effective steps are to be taken toward bringing order out of the present chaos, it must be accomplished through the action of some committee vested with the proper authority to carry out whatever plans may be decided upon. I would therefore propose, as a final suggestion, that the Entomological Society of America appoint a committee of considerable permanence, which would take up this matter in detail, and which would be prepared to decide upon whatever points in anatomical terminology might be presented for its consideration. The conclusions of such a committee, being authoritative, would doubtless be readily accepted by entomologists in general.